STRUCTURAL FLOOR ANALYSIS

ROOM 1019 FEDERAL BUILDING 517 Gold Avenue, SW

Albuquerque New Mexico

BPLW Architects & Engineers, Inc.
Albuquerque, New Mexico
Architect's Project Number: 91062.005

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INTRODUCTION

INTRODUCTION:

The purpose of this report is to explain the investigation, structural floor analysis, and the results of this analysis on room 1019 of the Federal building located at 517 Gold Avenue SW, Albuquerque, New Mexico. This report was requested by the General Services Administration, Design and Construction Division, Fort Worth, Texas through order number P-07-92-JU-0051.

SCOPE

SCOPE:

The investigation of room 1019 was prompted by the U.S. Forest Service's request to replace the current air handling unit in the room with a new one with a higher capacity. The structural investigation of the floor slab in room 1019 was to determine if the new air handling unit could be installed without causing the floor slab to become overstressed. The investigation consisted of a review of all data supplied by GSA, a site investigation, structural floor slab analysis, conclusions from the analysis, and recommendations on solutions to any inadequacies found during the analysis.

Copies of the original construction drawings of the building were supplied by GSA for a seismic analysis currently underway. These plans were used to determine the structural floor system of room 1019. The drawings show a two-way slab system supported by concrete columns at twenty-five feet on center. Reinforcement for the slabs is called out on the plans. This information was used to determine the load capacity of the floor.

The site investigation was performed on February 14, 1992 by our office. The site investigation was performed to gather additional data and to verify existing conditions of the floor slab and the loads imposed on it.

The structural floor slab analysis was performed by the equivalent frame method as prescribed by ACI 318-89 and PCA's "Notes on ACI 318-89, Building Code Requirements for Reinforced Concrete". Dead loads were taken from the plans mentioned earlier and from the data gathered during the site investigation. Live loads were taken from the Uniform Building Code, 1991 Edition.

Conclusions based on the structural analysis are presented in this report as are recommendations concerning the condition of the floor slab with regard to strength and serviceability.

PLAN REVIEW

PLAN REVIEW:

The plans supplied by GSA, as mentioned earlier, showed the floor slab to be a two-way concrete slab supported by concrete columns. The slab was indicated to be an 8" thick and having dropped panels (8'-4" x 8'-4" x 4" thick) at the columns.

The supplied plans are dated 1956, and are somewhat obscure as to the strengths of materials used. The reinforcing used was specified to comply with ASTM 305-49, an ASTM reference that has since changed to ASTM 615. However, ASTM 615 allows for two different grades of reinforcing, grade 40 with a yield strength of 40 ksi and grade 60 with a yield strength of 60 ksi. Since there was no reference to which grade of reinforcing was used, we assumed that it was grade 40, feeling that it was much more likely to have been used in 1957 than grade 60. Also rather obscure was the strength of the concrete specified for the floor slabs. The plans allowed for three strengths of concrete to be used on the building, 2500 psi, 3000 psi, and 3750 psi. The plans did call for the columns to be of 3750 psi concrete and the walls to be of 3000 psi concrete. We assumed that it was far more likely for the slabs to be the same strength as the walls, so the calculations were based on a concrete strength of 3000 psi. One other pertinent item that was fairly obscure on the plans was the floor slab reinforcement. No reinforcement was specifically called out for the floor slab at column lines "E" or "F" in the north-south direction. However, these column lines are fairly typical and were assumed to be reinforced the same as column line "D". This type of noting, noting one typical item and making the other typical ones the same, was common practice in old style plans.

SITE INVESTIGATION

SITE INVESTIGATION:

The site investigation was performed on February 14, 1992 to verify existing conditions of the floor slab and the loads. At the time of the site investigation, Room 1019 was being used by the U.S. Forest Service as a computer room to house a Data General MV40,000 main frame computer system. Data concerning the computer system, existing air handling unit, and other equipment in the room was gathered.

An access floor had been installed in the room. This would have allowed visual access to the floor slab itself if the access panels had not been covered by computer equipment. The equipment in the room was arranged in such a manner (photographs #1 - #3, Appendix A) that virtually none of the panels could be removed, and certainly not enough of the panels to allow a good overall view of the floor slab.

There was no obvious evidence of structural distress in the floor slab at the time of the site investigation.

The existing air handling unit (see right-hand side of photograph #4, Appendix A) was a Data model number CCT-15A2 manufactured by Airflow Company. The unit is currently situated along the south wall of the room.

STRUCTURAL ANALYSIS

STRUCTURAL ANALYSIS:

LOADS:

The loads generated and listed in Appendix B include the dead loads of the structure and fixed equipment in the vicinity of Room 1019. The structure dead loads were based on the plans supplied by GSA since no evidence to the contrary was discovered during the site investigation.

Investigation of Airflow Company's product literature revealed that the existing air handling unit weighs 2000 lbs. The weight of the new unit was taken from the U.S. Forest Service specifications supplied by GSA. The weight of the new unit was listed in those specifications as 2780 lbs. However, since the specifications indicated a specific unit as manufactured by Liebert or approved equal, the weight of the new unit was assumed to be 3000 lbs for the purpose of this analysis.

The weight of the main frame computer system was investigated by contacting the local office of Data General. Information provided by this source was sketchy at best. The weight of the system was referred to as "probably about 3000 lbs". Since the equipment appeared to be considerably heavier than this, the weight used for the purpose of this analysis was increased to 5000 lbs. This and the weights of the other equipment in the room are listed in Appendix B. The total load of the equipment was divided by the area of the room to provide a uniform load.

METHOD OF ANALYSIS:

The method of analysis used was the Equivalent Frame method as per ACI 318-89 (see Appendix B for calculations). This was used to calculate the floor slab stiffnesses at typical sections, dropped panels and at columns. The "equivalent frame" was then modeled on the computer to calculate the stresses in the slab and the columns. The stresses in the members were factored with appropriate ACI load factors in load combinations #1 and #2. Deflections were also calculated by the computer program, but these are based on the gross moment of inertia, not the effective moment of inertia and are thus underestimated. The factored stresses calculated by the computer program were then compared to the ultimate moment capacity of the member.

RESULTS

RESULTS:

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The results of the analysis revealed that the slab was overstressed when all loads were used, so a fifth load combination was added representing only factored dead and live loads. This revealed that the loads of the equipment in the room actually contribute very little to the stresses in the floor slab. The majority of the stresses, approximately 95%, was caused by structure dead loads and UBC prescribed live loads.

Still, the results of the analysis were surprising. They indicated that under only dead and live loads the floor slab was overstressed. Considering the fact that the building has survived 35 years of use, the results were assumed to be in error. The results from the computer analysis were then checked by hand, using the moment distribution method illustrated in PCA's "Notes on ACI 318-89, Building Code Requirements for Reinforced Concrete". To simplify this analysis, all of the columns were assumed to be the same size as the interior columns below the first floor. This caused the moments calculated by this method to be slightly different from the computer analysis. However, the moments at the center column line, column line 3, were only about 4% different from the computer results. This served to verify that the results from the computer analysis were indeed correct. The results indicated that the floor slab was overstressed when loaded with the live load prescribed by the Uniform Building Code.

CONCLUSIONS

CONCLUSIONS:

Several conclusions can be deduced from the results of this analysis. It is possible that the actual material properties used in the building exceeded those indicated on the plans. This would have increased the capacity of the slab. However, since no material testing was allowed for with this contract, it is not possible to determine the actual material properties nor the actual capacity of the slab.

Another possibility is that the floor in this area of the building has never experienced the full UBC live load. The indicated 50 psf for offices is generally a conservative figure, especially for an area such as this one, where there are relatively few people who actually work in the room.

A third conclusion that can be drawn from these results is that the slab has actually been overstressed. Two-way slab systems are very forgiving when it comes to a certain area becoming overstressed. Moments are redistributed to other areas of the system so that many areas have to become overstressed before an actual collapse occurs. However, no evidence of the slab being severely overstressed was observed during the site investigation.

RECOMMENDATIONS

RECOMMENDATIONS:

It is apparent from the results of this analysis that there is a good chance that the floor slab in Room 1019 would not withstand the loads that the Uniform Building Code requires that it withstand. However, it is not possible to determine if the actual capacity without testing the materials actually used for the structure. Therefore, the first recommendation would be to have the existing materials tested to determine their actual structural properties. This should be done not only for Room 1019, but also for the entire building.

The second recommendation would be to have the entire building be analyzed for gravity loads given the results of the material testing. This is the only way to determine if the structure poses a threat to the safety of the occupants. If the building does not meet the requirements of the Uniform Building Code, then a method of upgrading the structure to do so should be researched and enacted. Until such time as this can be accomplished, measures should be taken by the building manager to insure that the floor live load in any part of the building does not reach 50 psf.

With regard to the primary purpose of this report, that of determining if the floor could withstand the additional load induced by the installation of a larger air handling unit, the analysis revealed that the additional load would not increase the existing stresses in the slab to such a degree as to cause concern. The new unit may be installed.

APPENDIX A

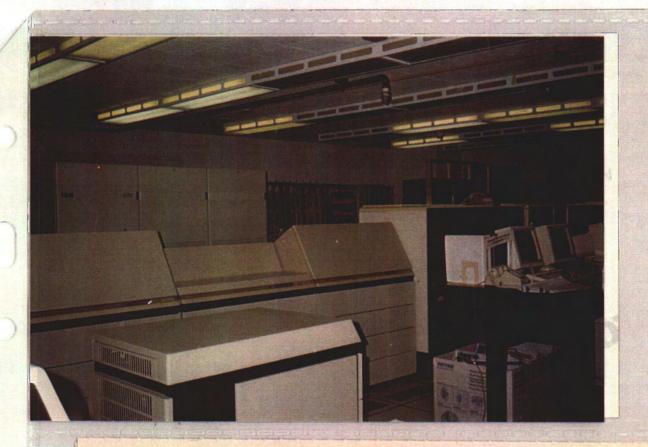


PHOTO #1

PHOTO #2



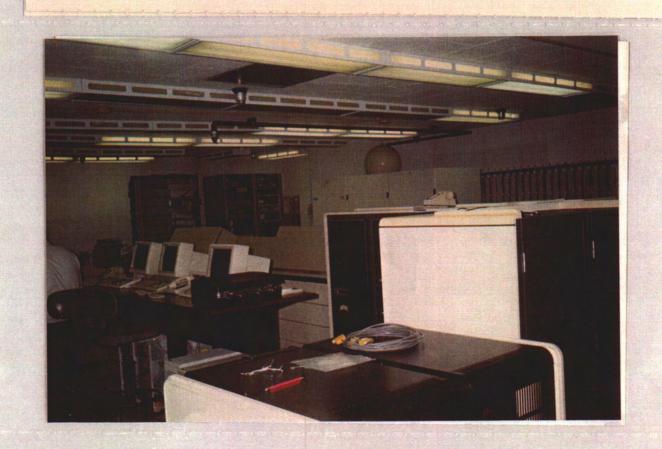
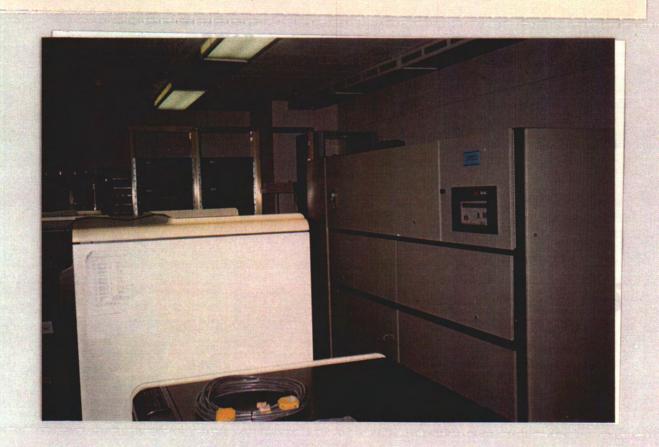




PHOTO #3

PHOTO #4



APPENDIX B

☐ Memorandum ☐ Telephone record □ Note to the file Project chitects & Engineers, Inc. ☐ Minutes of meeting Subject ☐ To be typed 2400 Louisiana Blvd. NE 63 East Main Street Project No. 91062,005 Date 3/3/92 By JmW puerque, NM 87110 881-2759 Mesa, AZ 85201 FLOOR LOADS: 8" SLAB 100pst DEAD: PARTITIONS 15 psf SUSPENDED CEILING = 14 pst MECH 4 psf 3 psf ELEC ACCESS FLR 10 psf 146 psf 50 psf LIVE: COMPUTER ROOM 125 psf STORAGE COMPUTER EQUIPMENT: CPU MVH40 POWER CENTER 5000# MERC CAB #1-#4 RAM DISK 250# CONSOLE TABLE 500# CAB, DISK, DISK UTILITY TABLE 500# 6300TO, 8MMCTD POWER COND. 150# LINE PRINTER 500# COMM EQUIP. 500[#] TEL. SWITCH 500# COMM EQUIP 1000# ROLM 9751 9100# FLR, AREA = 25'x 33' = 825 SF.

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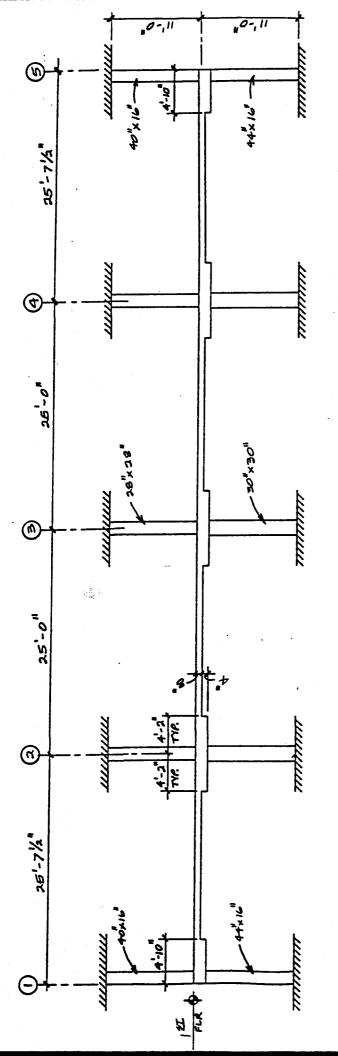
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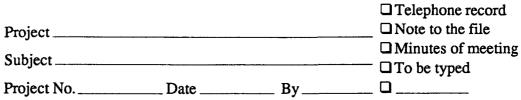
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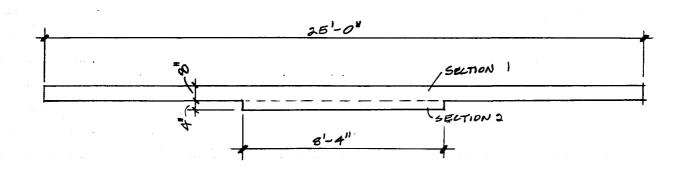
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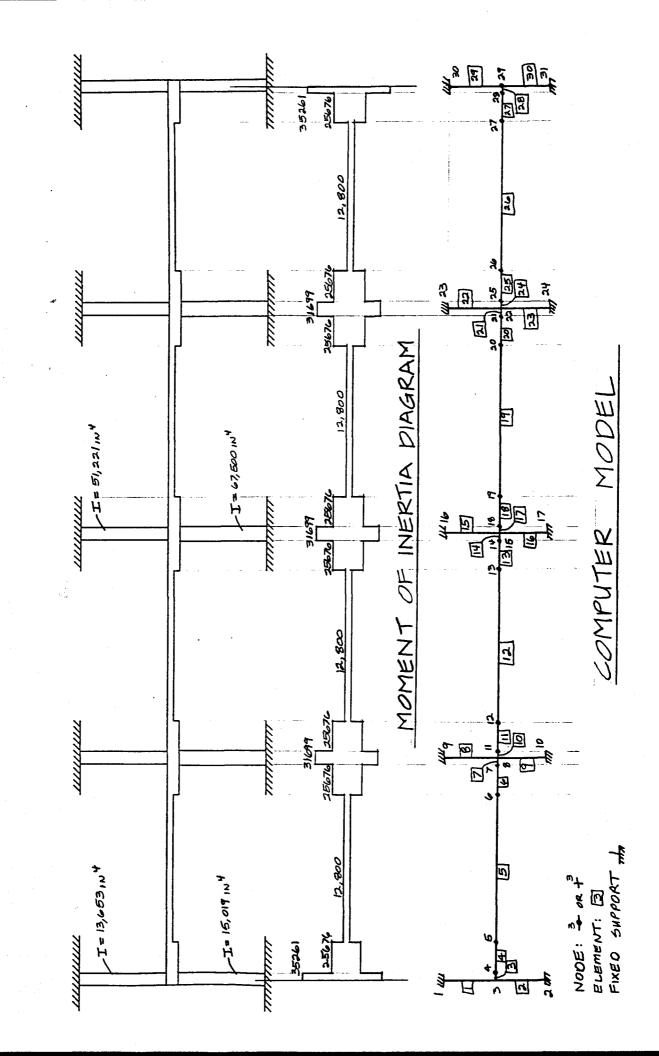


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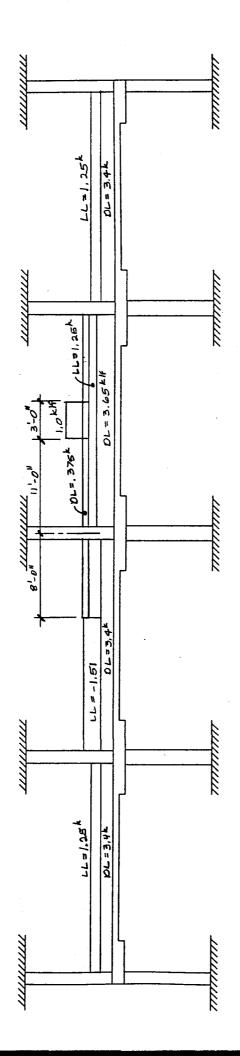


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	5	0.0000	-0.0522	-0.0963
			O OF 4.4	0.1007
13	1	0.0000 0.0000	-0.0544 -0.0541	0.1007
	2	0.0000	-0.0364	0.0675
	4	0.0000	-0.0368	0.0678
	5	0,000	-0.0528	0.0966
14	1	0.000	-0.0042	0.0241
	2	0.000	-0.0061	0.0236
	2 3	0.000	-0.0041	0.0160
_	4	0.000	-0.0042	0.0165
ź	5	0.000	-0.0060	0.0243
15	1_	0,0000	-0.0042	-0.0025
(2	0.0000	-0.0043	-0.0030
/	3 4	0.0000 0.0000	-0.0029 -0.0028	-0.0019 -0.0013
<u> </u>	5	0.0000	-0.0026 -0.0040	-0.0010
_16	1	0.0000	0.0000	0.0000
ì	2 3	0.0000	0.000	0.0000
	3	0.000	0.000	0.000
	4	0.000	0.000	0.0000
Ì	5	0.000	0.000	0.0000
 -1.7	1	0.0000	0.0000	0.0000
Ţ ĺ	ż	0.0000	0.0000	0.0000
	2 3 4	0.0000	0.0000	0.0000
		0.0000	0.0000	0.0000
	5	0.0000	0.000	0.0000
			a	0.0740
18	1	0.0000	-0.0073	-0.0319
	2 3	0.0000	-0.0075	-0.0331
-	<u>ئ</u> م	0.0000	-0.0050 -0.0048	-0.0219 -0.0207
<u> </u>	4	0.0000	-0.0048	-0.0207

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ROSRAM : General Frame Analysis v1.58

TIME : Fri Mar 06 15:37:55 1992

LW. INC. DB GSA COMPUTER ROOM 1019 - SLAB BEAM F JOB NO. : 19

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27 9	.4												
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40		NOD	A L	D 1	[8	F	1.	4 C	E] \	E	NT	S

OLÉ NO	LOAD COMB	NODAL DI	DY DY	ROTATION	
The second secon	TOTAL COLUMN COL	0.0000	-0,0065	-0.0275	
19	1	0.0000	-0.0643	-0.1163	
		0.0000	-0.0660	-0.1193	
	3	0.000 0.000	-0.0439 -0.0419	-0.0794 -0.0757	
	4 5	-0.0000	-0.0548	-0.1030	¥
	<u>. </u>	~ * ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	Table 28 Table State State State	y 11 22 2 47 2	
20	.1	-0.0000	-0.0637	0.1159	
		-0.0001	-0.0654	0.1189	
-	3	-0.0000	-0.0435	0.0791	
	4 5	-0.0000	-0.0415 -0.0558	0.0754 0.1023	
*	!	-0.000	~0.0336	the attractor	
21	i.	-0.0001	-0.0071	0.0306	
 /	Z	-0.0001	-0,0073	0.0318	
	3	-0.0000	-0,0049	0.0210	
,	4	-0.0000	-0.0047	0.0197	
	5	-0.0001	-0.0063	0.0255	
1	1	-0.0001	-0.0043	0.0010	
	2	-0.0001	-0.0043	0.0015	
<u>~</u>	3	-0.0000	-0.0029	0.0008	
	4	-0.0000	-0.0029	0.0003	
<u> </u>	5	-0.0001	-0.0041	-0.0013	
1 23	1	0.0000	0.0000	0.0000	
≡ %⊃	2	0.0000	0.0000	0.0000	
	3	0.0000	0,0000	0,0000	
	4	0.0000	0,0000	0.0000	
	5	0.0000	0.0000	0.0000	
	•	0.0000	0.000	0.0000	
1 24	1	0.0000	0.0000	0.0000	
~	2 ₃ 3	0.0000	0.0000 0.0000	0.0000	
	4	0.0000	0.0000	0.0000	
•	5	0.0000	0.0000	0.0000	
- 25	1	-0.0001	-0.0067	-0.0276	
_	2 3	-0.0001	-0.0066	-0.0271	
	3	-0.0000	-0.0045	-0.0185	
	4	-0.0000	-0.0045	-0.0190	
	5	-0.0001	-0.0048	-0.0297	

:OGRAM : General Frame Analysis v1.58

PAGE NO. 8

TIME: Fri Mar 06 15:37:56 1992

BE GSA COMPUTER ROOM 1019 - SLAB BEAM F

JOB NO. : 13

HA 22 T																		
IO E	LOAD COMB	N	0	D	Α	L. DX	D	I	: == : =	F	L.	C OY	F	M	E	N	T	ROTATION
26	e men men men van van des men men ver	idi 44 751 7				.0001	and may as					36(36(-0.1123 -0.1120

26	1 .	-0.0001	-0.0605	-0.1123	
	<i></i>	-0.0001	-0.0402	-0.1120	
		-0.0001	-0.0408	-0.0758	
	4	-0,0000	-0.0412	-0.0761	
	S	-0.0001 *	-0.0620	-0.1138	
	- ,				
3 73 "7	1	-0,0001	-0.1210	0.1418	
£ 7	2	-0.0001	-0.1209	0.1416	
J	3	-0.0001	-0.0817	0.0957	
		-0.0001	-0.0818	0.0759	
	4 5		-0.1215	0,1425	
	3	-0.0001	Million de	Walthau	
				وسمارين بمورين بدر	
28	1	-0,0001	-0.0145	0.0907	
	2	-0.0001	-0.0165	0,0906	
	3	-0.0001	-0.0112	0.0612	
-	4	-0.0001	-0.0112	0.0613	
J	5	-0.0001	-0.0166	0.0910	
<u></u>					
53	1	-0.0001	-0.0023	0.0727	
 !	2 3	-0.0001	-0.0023	o.072 7	
ue.	3	-0.0001	-0.0015	0.0491	
.	4	-0.0001	-0.0015	0.0492	
J. Comment	5	-0.0001	-0.0023	0.0730	
ŝo	1	0.0000	0.000	0.0000	
	2	0.0000	0.0000	0.0000	
·	3	0.000	0.000	0.0000	
!	4	0,0000	0.000	0.000	
•	5	0.0000	0.000	0.000	
•					
51	1	0.0000	0.0000	0,000	
	2 3	0.0000	0.000	0.0000	
	3	0.0000	0.000	0.0000	
	4	0.0000	0.000	0.0000	
	5	0.0000	0.0000	0.0000	

	/	,4	ELE	MENT	T REPO	RTS		
LE	M LDAD	NODE		SIGN	CONVENTION	: BEAM	DESIGNERS	
NP	COMB	NO	AXIAL	9	SHEAR	MOMENT	MAX MOM	NDEFL DIST
====	_=========		.=====================================			========	= = = = = = = = = = = = = = = = = = =	.

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PAGE NO. 9 ROBRAM : General Frame Analysis v1.58 TIME : Fri Mar 06 15:37:59 1992 INC. GSA COMPUTER ROOM 1019 - SLAB BEAM F JOB NO. : 19 INT: 1 ELEMENT REPORTS SIGN CONVENTION : BEAM DESIGNERS LOAD NODE MOMENT MAX MOM/DEFL DIST NO AXIAL SHEAR NO COMB COMBINATIONS: 1.40 X CASE 1: 1 1.70 X CASE 1.40 X CASE ... 1.40 X CASE 1.40 X CASE . 1.70 X CASE 1.70 X CASE 1.70 X CASE J : 1.00 X CASE 1115 1.00 X CASE 2 3 1.00 X CASE 1.00 X CASE h H 1.00 X CASE 1 1.00 X CASE 1.00 X CASE 5 : 1.40 X CASE 1 1.70 X CASE 3. 38.5914 -20.9557 153.6046 1 -0.0249 3.66 38.5914 -20.9557 -76.9081 38.5919 -20.9566 153.6106 -20.9566 -76.9120 -0.0249 1 38.5919 3.66 26.0672 3 3 -14.1564103.7668 1 26.0672 -14.1564-51.9536 -0.0168 3.67 3 26.0666 -14.1554103.7599 26.0666 -14.1554-51.9492 -0.0168 3.67 1. 5 38.6254 -20.9867 153.8464 38.6254 -20,9867 -0.0250 3.67 -77.0078

-22.9677

-22.9677

-22.9680

-15.5166

-15.5166

-22.9680

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56.8427

-168.5100

-113.8398

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7,33

7.33

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-168.5074

-42.4505

-42.4505

-42.4511

-42.4511

-28.6739

-28.6739

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MOGRAM : General Frame Analysis v1.58

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TIME: Fri Mar 06 15:38:04 1995

INC.

OB GSA COMPUTER ROOM 1019 - SLAB BEAM F

JOB NO. : 1

		P. 1 km2 day from	ELEM	ENT REP SIGN CONVENTI	ORTS		
NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
	4	. 3	-28.6733 -28.6733	-15.5163 -15.5163	56.8423 -113.8368	0.0168	7.33
	- 5		-42,4879	-23.0188	84.3402		
		**************************************	-42.4879	-23.0188	-148.8566 *	0.0250	7.53
3	1	3	-2.0120	81.0419	-322.1120		
		4	-2.0120	75.3274	-257.2187	0.0004	0.41
	25. 27.	.33	-2.0114	81.0430	-322.1206		
		4	-2.0114	75.3284	-257,2265	0.0004	0.41
	3	3	-1,3602	54.7411	-217.6066		
		4	-1.3602	50.8816	-173.7731	0.0003	0.41
	4	3	-1.3609	54.7400	-217.5967		
		4	-1.3609	50.8805	-173.7643	0.0003	0.41
	5	3	-2.0321	81.1133	-322.7130		
		4	2.0321	75.3988	-257.7605	0.0004	0.41
4	1	4 :	-2.0120	75.3274	-257.2187		
		4 : 5	-2.0120	47.7874	-10.9891	0.0054	1.68
	2	4	-2.0114	75.3284	-257.2265		
		5	-2.0114	47.7884	-10.9929	0.0054	1.68
	3	4	-1.3602	50.8816	-173.7731		
		5	-1.3602	32.2816	-7.4467	0.0037	1.68
	4	4	-1.3609	50.8805	-173.7643	يست مهمين من رور	a cm
•		5	-1.3609	32.2805	-7.4425	0.0037	1.68
	5	4	-2.0321	75.3988	-257.7605	en en en en en	4 (175
		5	-2.0321	47.8588	-11.2453	0.0054	1.69
Ď	1	5	-2.0120	47.7874	-10.9891	154.8522	6.94
		5	-2.0120	-62.3726	-127.6708	-0.1590	7.49
	2	5	-2.0114	47.7884	-10.9929	154.8556	6.94
		6 -	-2.0114	-62.3716	-127.6582	-0.1590	7.49
	3	5	-1.3602	32.2816	-7.4467	104.6074	6.94
		6	-1.3602	-42.1184	-86.1408	-0.1074	7.49

RO<mark>G</mark>RAM : General Frame Analysis v1.58

PAGE NO. 11

PLW. INC. DB GSA COMPUTER ROOM 1019 - SLAB BEAM F IN 1

TIME : Fri Mar 06 15:38:13 1992 JDB NO. : 19

1	and and only from your Park Son		day nadad saman nadan WMA kathan senan hagan sebaga sahan nagar 1811 h	had been only due only only that the best best being beet being			1 1100 CAND THE TOTAL BELLE IN THE
			E L E M		DRTS		
. Sh	LOAD	NODE	SIGN CONVENTION : BEAM DESIGNERS				
Ò	COMB	NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
		1 121 122 122 123 133 133 133 133 133 13		dire dagi dige dide dagi pertenda saka adia adia dagi taga tade mat		THE CHAIR SHEET SHEET SHEET PLANT HERE SHEET	
-	4		-1.3609	32.2805	-7.4425	104.6035	6.94
		, 6	-1,3609	-42.1195	-86.1552	-0.1074	7.49
	<u></u> j		-2.0321	47.8588	-11,2453	155.0919	6,95
<u> </u>		ద	-2.0321	-62.3012	-126.7847	-0.1594	7.50
	*						
6	1	6	-2.0120	-62.3726	-127.6708		
		7	-2.0120	-85.3685	-374.3985	0.0074	1.81
	2	ó	-2.0114	-62.3716	-127.4582		
-		7	-2.0114	-85.3675	-374.3825	0.0074	1.81
1	3	6	-1.3602	-42.1184	-86.1408		
		7	-1.3602	-57.6494	-252.7530	0.0050	1.81
	4	6	-1.3609	-42.1195	-86.1552		
•	7	7	-1.3609	-57.4505	-252.7712	0.0050	1.81
.	5	6	-2.0321	-62.3012	-126.7847		
	J	7	-2.0321	-85.2971	-373.2739	0.0073	1.81
7	. 1	7.5	-2.0120	-85.3485	-374.3985		
		8	-2.0120	-91.0831	-447.6259	0.0006	0.42
	2	7	-2.0114	-85.3675	-374.3825		
		8	-2.0114	-91.0820	-447.6090	0.0006	0.42
	. 3	7	-1.3602	-57.6494	-252.7530		
		8	-1.3602	-61.5089	-302.2037	0.0004	0.42
,		7	-1.3609	-57.6505	-252.7712		
ļ	4	8	-1.3609	-61.5100	-302.2229	0.0004	0.42
	µ=-		proc. of the proc. A	person years are a			
Î	5	7 8	-2.0321 -2.0321	-85.2971 -91.0117	-373.2739 -446.4421	0.0004	0.42
		Same?	adalah 19 - Tali Mani dalam yak	e de estate de e	r r topic at r r topic at	a	
	1	8	84.9121	1.2389	-9.2192		
J		9	84.9121	1.2389	4.4088	0.0004	3.72
	, - ,	. 0	O4 6057	1.2547	-9.3375		
	2	8 9	84.8956 84.8956	1.2547	-9.33/5 4.4644	0.0004	3.72
		-					
Ť	3	8 9	57.1256 57.1256	0.9558 0.9558	-7.0963 3.4173	0.0003	3.71
		•		ura rususus	war That I had	ALC ME THE SECOND SHEET	fore the of side

PAGE NO. 12 TIME: Fri Mar O6 **15:**38:18 1992

GSA COMPUTER ROOM 1019 - SLAB BEAM F

JOB NO. : 19

INC.

ELEMENT REPORTS LOAD MODE SIGN CONVENTION : BEAM DESIGNERS 1. MOMENT MAX MOM/DEFL DIST AXIAL SHEAR COMB NO NO -6,9620 57.1442 0.9378 8 0.0003 3,71 o.9378 3,3540 . 9 57.1442 8 2,4838 -18.29425 82.4860 0.0008 3,68 9 2,4838 9.0277 82.4860 -97.4756 1.8251 -6.8686 1 10 1.8251 13,2079 -0.004 7,38 -97.4756 8 -6.9604 1.8493 2 10 -97.4567 7,38 13.3822 --0,0004 8 -97.4567 1,8493 -5,1933 3 10 -45.5778 1.3850 -0.0003 7.57 10.0416 8 -65.5778 1.3850 -5.0892 -65.5992 1.3576 10 -65.5992 -0.0003 7.37 1.3576 9.8438 8 10 3.3876 -12.5263-94.6905 3.3876 7.35 24.7378 -0.0008 8 -94.6905 91.3046 -425.1988 -1.4258 8: 85.2232 0,0006 0.41 11 -1.4258 -351.9398 8 91.2702 -424.8893 2 -1,4168 0.41 0.0006 11 -1.416885.1888 -351.6588 3 8 -0.9310 61,1945 -285.0657 0.0004 0.41 11 -0.9310 57.1192 -235.9655 8 -0.9412 61.2334 -285.4170 11 -0.9412 57.1581 -236.2845 0.0004 0.41 8 -1.128286.1649 -403.4101 5 80.4503 0.0006 0.41 11 -1.1282 -334.2648 11 -1.4258 85.2232 -351.9398 -1.4258-108.1629 0.0067 1.52 12 60.7510 -351.6588 11 -1.416885.1888 12 -107.99690.0067 1.52 -1.416860.7166 -235.9655 3 11 -0.9310 57.1192 -72.5744 0.0045 1.52 12 -0.931040.7198

CORAM: General Frame Analysis v1.58 PAGE NO. 13 TIME : Fri Mar 06 15:38:23 1992 LW. INC.

IN I

GSA COMPUTER ROOM 1017 - SLAB BEAM F

JOR NO. : 15

¥	.i. 				mare these story from same man passes signs short same to the same story	mand three mans corre which above pates about the mileton state many mi-				
			ELEMENT REPORTS							
		LOAD	NODE		SIGN CONVENTI		BIGNERS MAX MOM/DEFL	DIST		
√() ====================================		COMB	NO	AXIAL	SHEAR	MOMENT				
-		4	11	-0.9412	57,1581	-236,2845	275 - 275 276 28 207	1.57		
			12	-0.9412	40.7587	-72.7633	0.0045	ii e siratii		
		5	1.1	-1.1282	80,4503	-334.2648				
			12	-1.1282	57.4544	-103.9639	0.0064	1.5%		
				*						
12		1	12	-1.4258	60.7510	-108.1629	143.6921	8.29		
			13	-1.4258	-59.9312	-111.0821	-0.1522	8.31		
					e en	4 75 77 75 75 7 75	143.5730	8.29		
		2	12 13	-1.4168 -1.4168	60.7166 -59.9656	-107.9969 -111.4895	-0.1520	8.31		
			3. C.	the Mark of the Charles	Vand of the Control Country Count	offer offer offer of trans' of trans'				
		3	12	-0.9310	40.7198	-72.5744	76.2753	8.29		
			13	-0.9310	-40.2717	-74.5760	-0.1019	8.31		
		4	12	-0.9412	40,7587	-72,7633	96.4092	8,30		
		•	13	-0.9412	-40.2328	-74.1162	-0.1021	9.32		
					d 4 /	يسرنهما ويسر مهماني ي	ينتم يندر الرابعة المسروبين	en er a		
		5	12 13	-1.1282 -1.1282	57.4544 -57.3185	-103.9639 -102.8312	135.7609 -0.1440	8.34 8.34		
•			.i!	a a a a a a a a a a a a a a a a a a	en variabilities	d Wain a tolen de ain	Man " ## value 2 il 1 1/20"	tar a rain y		
Ì										
3		1	13 14	-1.4258 -1.4258	-59.9312 -82.8582	-111.0821 -348.8265	0.0047	1.81		
			1 2)	-1.4208	-62:8082	-540,6200	0.0007	1.01		
		2	13	-1.4168	-59.9456	-111.4895				
			14	-1.4168	-82.8926	-349.3485	0.0067	1.81		
B			13	-0.9310	-40.2717	-74.5760				
		·•1	14	-0.9310	-55.7562	-234.4625	0.0045	1.81		
f		4	13 14	-0.9412 -0.9412	-40.2328 -55.7173	-74.1162 -233.8731	0.0045	1.81		
•			1 4	TU = 7412			or come	1 1 U.S.		
•		5	13	-1.1282	-57.3185	-102.8312				
			14	-1.1282	-80.2456	-331.8754	0.0063	1.81		
3		1	14	-1.4258	-82.8582	-348.8265				
			15	-1.4258	-88.5728	-419.9704	0.0006	0.42		
_		73	1.0	-1.4168	-82.8926	-349.3485				
		2	14 15	-1.4168	-82.8726 -88.6072	-420.5209	0.0006	0.42		
					THE COLUMN THE PERSON OF THE COLUMN THE COLU	- mover up and Marie Affairs 166" of	# 1971 1971 1971 1971 1971			
•		3	14	-0.9310	-55.7562	-234.4625	en en en en en	,e. a.e		
			15	-0.9310	-59.6157	-282.3418	0.0004	0.42		

OCAAM : General Frame Analysis v1.58 PAGE NO. 14

TIME : Fri Mar 06 15:38:32 1992

LW, INC. GSA COMPUTER ROOM 1019 - SLAB BEAM F

).a	LOAD	NODE	ELEM	ENT REPO SIGN CONVENTION		GIGNEPS	
	COMB	NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
		•					
	4	14 15	-0.9412 -0.9412	-55,7173 -59,5748	-233,8731 -281,7201	0.0004	0.4%
		•	, , , , , , , , , , , , , , , , , , , ,		The same of the same tage. It		
r.	5	14 15	-1.1282 -1.1282	-80.2456 -85.9601	-331.8754 -400.8508	0.0006	0.42
ì							
5	1	15	87.3612	-2.7109	19.8388		
		16	87.3612	-2.7109	-9.9807	-0.40009	3.66
	2	15	88.2503	-3,2481	23.7757		
.		16	88.2503	-3.2481	-11.9536	-0.0010	3.66
	3	15	59.1421	-2,0504	15.0100		
-		16	59.1421	-2.0504	-7,5448	-0,0006	3.66
	4	15	58.3960	-1.4477	10.5931		
		16	58.3960	-1.4477	-5.3314	-0.0005	3.66
	5	15	82.0428	-1.1089	8.1258		
į		16	82.0428	-1.1089	-4.0719	-0.0004	3.66
<u></u>	1	17	-100.2870	-3.5136	12.8294		
_		15	-100.2870	-3.5136	-25.8205	0.0009	7.33
ŀ	2	17	-101.3077	-4.2174	15.4062		
Į.		15	-101.3077	-4.2174	-30.9856	0.0010	7.33
	3	17	-67.8928	-2.6640	9.7329		
ł		15	-67.8928	-2.6640	-19.5706	0.0006	7.33
ŀ	4	17	-67.0362	-1.8744	6.8420		
ý		15	-67.0362	-1.8744	-13.7760	0.0005	7.33
•	5	17	-94,1818	-1.4527	5.3185		
İ		15	-94.1818	-1.4527	-10.6608	0.0004	7.33
b	1	15	-2.2285	99.0754	-465,6297		
	at.	18	-2.2285	92.6346	-386.0701	0.0004	0.41
ı,	2	15	-2.3861	100.9508	-475.2823		
		18	-2.3861	94.4166	-394.2048	0.0007	0.41
-	3	15	-1.5445	67.4192	-316.9224		
	-	18	-1.5445	63.0409	-262.7815	0.0004	0.41

ROBRAM : General Frame Analysis v1.58

PAGE NO. 15

TIME : Fri Mar 06 15:38:38 1772 LW. INC. DB GSA COMPUTER ROOM 1019 - SLAB BEAM F

			ELEMI		ORTS	· const. En . I grant gare, print,	
40 - 9 4	LOAD COMB	NODE NO	AXIAL	SIBN CONVENTI SHEAR	IBEAM DESI MOMENT TOMM	IAX MOM/DEFL	DIST
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	4	15	-1.3679	65.85 <u>5</u> 5	-306.0892		
		18	-1.3679	61.4772	-253.2461	0,0004	0.41
	5	15	-1,4720	90.2644	-419,6374		
		18	-1.4720	84.2594	-347.2101	0.0006	0.41
				.∗			
18	1.	18	-2,2285	92.6346	-386.0701		يسرسون و
		19	-2.2295	66.7938	-120.6218	0.0074	1.52
	2	18	-2.3861	94.4166	-394 2048		
-		19	-2.3861	48.2012	-123.4462	0.0075	1.52
	3	18	-1.5445	63.0409	-262.7815		
		19	-1.5445	45.4752	-82.1021	0.0050	1.52
	4	18	-1.3679	61,4772	-253,2461		
-	•	19	-1.3679	43.9115	-77.7740	0.0048	1.51
	S	18	-1.4720	84.2594	-347.2101		
	249	19	-1.4720	60.1668	-106.7404	0.0066	1.52
·							
9	1	19	-2.2285	66.7938	-120.6218	164.8430	8.33
		20	-2.2285	-66.9413	-121.8509	-0.1733	8.33
	2	19	-2.3861	68.2012	-123.4462	169.4748	8.33
		20	-2.3861	-68.3470	-124.6613	-0.1778	8.33
	3	19	-1.5445	45.4752	-82.1021	112.4797	8.33
	· -	20	-1.5445	-45.5847	-83.0146	-0.1182	8.33
	4	19	-1.3679	43.9115	-77.7740	104.9953	8.32
	•	20	-1.3679	-44.0228	-78.7020	-0.1118	8.33
	5	19	-1.4720	60.1668	-106,7404	143.4356	8.32
	ال.	20	-1.4720	-60.4406	-109.0226	-0.1525	8.32
1 0	1	20	-2.2285	-66.9413	-121.8509		
5		21	-2.2285	-92.8597	-388.7184	0.0075	1.82
_	2	20	-2.3861	-68.3470	-124.6613		
		21	-2.3861	-94.6411	-396.8514	0.0076	1.82
	3	20	-1.5445	-45.5847	-83.0146		
	_•	21	-1.5445	-63.2032	-264.6903	0.0051	1.82

OGRAM : General Frame Analysis v1.58

PAGE NO. 16

TIME : Fri Mar 06 15:38:48 1992

GSA COMPUTER ROOM 1019 - SLAB BEAM F

*	**	4.	
	 	 	

1	LOAD	NODE	E L E M	SIGN CONVENTION			
	COMB	NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
<i> 2 2</i> 2 2 2 2 2 2	NATION TO THE PARTY NAME AND ADDRESS ASSESSED AS			100 to			
1	4	20	-1.3679	-44,0228	-78.7020		
1		21	-1.3679	-61.6413	-255.1610	0.0049	1.82
j	5	20	-1.4720	-60.4406	-109.0226		
•	3	21	-1.4720	-84.6055	-351,2497	0.0067	1.82
ľ		.E.s. sk	als B 11 F of the Set	ting 1 H Start took South Conf	Sand South of the Manual Control of	, .	
i.	1	21	-2,2285	-92.8597	-388.7184	and the second of	m am
		. 22	-2.2285	-99.3005	-468.4649	0.0008	0.42
	2	21	-2,3861	-94.6411	-396.8514		
		22	-2.3861	-101.1753	-478,1152	0.0007	0.42
		.tm, u	t Eraae	A control of the site of the s	-254.6903		
,	3	21 22	-1.5445 -1.5445	-63,2032 -67,5814	-318.9660	0.0004	0.42
1		alle de	and it is the part of the	mar, Jar	mara.vamo	alina a alinana ani	Seef # 1 k of a
	4	21	-1.3679	-61.6413	-255.1610		
		22	-1.3679	-66.0195	-308.1403	0.0004	0.45
	5	21	-1,4720	-84.6055	-351.2497		
,	11		-1.4720	-90.6106	-423.9643	0.0006	0.42
		values (Pers					
hn.	1	ال المسروسي	88.7009	1.1502	-8.3303		
k1	.i.	22 _{, j} . 23	88.7009	1.1502	4.3218	0.0004	3.62
		abov Sout	Specificación de la Contraction de	and the same that state	a surviva pe sur		
ĺ	2	22	89.5885	1.6914	-12.2920		
		23	89.5885	1.6914	6.3137	0.0005	3.63
i	3	22	60,1510	0.9222	-6.6884		
	• •	23	60.1510	0.9222	3.4555	0.0003	3.63
	_			پسر محدی ہے میں	ودمو بعدم وي وسمي يسمر		
	4	22 23	59.4071 59.4071	0.3152 0.3152	-2.2458 1.2218		
ł		شک	37.40/1	್ ಕಟ್ಟಿಯಿಯನ್	i. L.L.		
h.	5	22	84.5871	-13340	9.8727		
		23	84.5871	-1.3340	-4.8013	-0.0004	3.70
ζ.	1	24	-101.8250	1.3656	-4.8695		
,		22	-101.8250	1.3656	10.1519	-0.0003	7.28
					_		
	2	24	-102.8439	2.0483	-7.4363	معمد بدايد إس	
		22	-102.8439	2.0683	15.3146	-0.0005	7.30
	3	24	-69.0508	1.1086	-3.9670		
	····	22	-69.0508	1.1086	8.2274	-0.0003	7.29

Rockam: General Frame Analysis v1.58 PAGE NO. 17

TIME : Fri Mar 06 15:38:53 1992 LW. INC.

OB GSA COMPUTER ROOM 1019 - SLAB BEAM F

JOB NG. : 17

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	LOAD	NODE	ELEME		N : BEAM DESIGNERS		
4 €	COMB	NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
		•					
	4	24	-68.1969	0.3206	-1.0986		
		22	-68.1969	0.3206	2.4379		
	5.	24	-97.1025	-1.8873	7.0389		
		22	-97.1025	-1.8873	-13.7219	0.0004	7.36
		· ·	en en al entren	ent 4 any ent eet al.			
24	1	22 25	-2.0132 -2.0132	91.2254 85.5108	-449.9827 -376.6372	0,0006	0.41
		الساسية.	udana diti "tat" uda "gant" afire	Securi Securi St. Securi sella "Seri Securi.	Track of South 25 South South of South	THE ART WE SEE SHOW	
	2	22	-2.0092	91,2571	-450.5086 [°]		
_		25	-2,0092	85.5426	-377.1367	. 0.000	0.41
	Z	om, om, des des	-1,3581	61.6204	-304.0501	•	
		25	-1.3581	57.7609	-254.5069	0.0004	0.41
	4	22	-1.3625	61.5845	-303.4565		
		ZS	-1.3625	57.7250	-253.9431	0.0004	0.41
	5	22	-2,0253	91.,0790	-447.5589		
5		25	-2.0253	85.3645	-374,3349	0.0006	0.41
-							
5	1	25	-2.0132	85.5108	-376.6372		
		26	-2.0132	62.5149	-129.4341	0.0074	1.55
	2	25	-2.0092	85.5426	-377.1367		
•		26	-2.0092	62.5467	-129.8277	0.0074	1.53
	3	25	-1,3581	57.7609	-254.5069		
		26	-1.3581	42.2299	-87.5223	0.0050	1.53
	4	25	-1.3625	57.7250	-253.9431		
		26	-1.3625	42.1940	-87.0785	0.0050	1.53
	5	25	-2.0253	85.3645	-374.3349		
		26	-2.0253	62.3686	-127.6206	0.0074	1.53
_							
5	1	26	-2.0132	62.5149	-129.4341	154.3797	9.08
		27	-2.0132	-47.6451	-10.4753	-0.1582	8.52
	2	26	-2.0092	62.5467	-129.8277	154.2746	9.08
		27	-2.0092	-47.6133	-10.3607	-0.1580	8.52
	3	26	-1.3581	42.2299	-87.5223	104.2371	9.08
	, u	27	-1.3581	-32.1701	-7.0443	-0.1068	8.52

:DBRAM : General Frame Analysis v1.58 E INC.

PAGE NO. 15 TIME : Fri Mar 06 15:39:02 1992

GSA COMPUTER ROOM 1019 - SLAB BEAM F

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			ELEMI		ORTS	projection of the state of the	
3 1	LOAD COMB	NODE NO	AXIAL	BIBN CONVENTI SHEAR	ON : BEAM DES! MOMENT **	IGNERS MAX MOM/DEFL	DIST
f ==							
	4	26	-1.3625	42.1940	-87.0785	104.3550	9.07
		27	-1.3625	-32.2060	-7.1749	-0.1070	8.52
	5	26	-2.0253	62.3686	-127.6206	154.8661	୭,୦ଥ
ì		27	-2.0253	-47.7914	-11.0031	-0.1590	8.51
7	1	27	-2.0132	-47.6451	-10.4753		
Į	J.	28	-2.0132	-75.1851	-256.1356	0.0054	2.32
	2	27	-2.0092	-47.6133	-10,3607		
		28	-2.0092	-75.1533	-255.8940	0.0054	Z. 32
	3	27	-1,3581	-32.1701	-7,0443		وهم ورضها وهمو
		28	-1.3581	-50,7701	-172,9248	0.0036	W. 52
	4	27	-1.3625	-32,2060	-7.1749 -173.1990	0.0037	
		28	-1.3625	-50.8060	ーエノン・エブブリ	U,OOS/	கூரை விக
	5	27 28	-2.0253 -2.0253	-47.7914 -75.3314	-11.0031 -257.2487	0.0054	yang sangga Malan Salah
		دسة بينه	india de la Cada de Santa de Cada de C	of the second desired	alia bad / B dia F bad /	The Board Section 1	stree A Tank vis.
3	1	28 :	-2.0132	-75.1851	-256.1356		
		29	-2.0132	-80.8994	-320.9108	0.0004	0.42
	2	28	-2.0092	-75.1533	-255.8940		
		29	-2.0092	-80.8679	-320.6428	0.0004	O.4Z
	3	28	-1.3581	-50,7701	-172.9248	0.0003	0.42
		29	-1.3581	-54.6296	-216.6657	0,0003	V.s ≒r∠
,	4	28 29	-1.3625 -1.3625	-50.8060 -54.6655	-173.1990 -216.9697	0.0003	0,42
						THE RESERVE OF THE SECOND	31 A was
	5	28 29	-2.0253 -2.0253	-75.3314 -81.0460	-257.2487 -322.1453	0.0004	0.42
9	1	29	38.5236	20.8733	-153.0080		
		30	38.5236	20.8733	76 .5 980	0.0248	3.67
	2	29	38.5085	20.8569	-152.8843		
		30	38.5085	20.8569	76.5400	0.0248	3.67
	3	29	26.0141	14.0933	-103,3077	سستويد يم	
		30	26.0141	14.0933	51.7188	0.0168	3.67

PAGE NO. 19 RAM : General Frame Analysis v1.58 TIME: Fri Mar 06 15:39:06 1992 PLW. INC. GSA COMPUTER ROOM 1019 - SLAB BEAM F Œ JOB NO. : 19 JM ELEMENT REPORTS SIGN CONVENTION : BEAM DESIGNERS LOAD NODE SHEAR MOMENT MAX MOM/DEFL DIST AXIAL COMB NO 29 26.0312 14.1119 -103,4458 $\mathbb{Z}(\mathbb{C})$ 26.0312 14,1119 51,7847 0.0168 5 29 38,5933 20.9514 -153.5844 0.0249 30 38.5933 20.9514 76.8808 -42.3760 -83.8479 22.8854 31 -0.0248 7.33 29 -42.3760 22.8864 167.9028 31 -42.3594 22.8662 -83.7716 2 29 -42,3594 22.8662 167.7565 -0.0248 15.4514 31 -28,6155 -56.6076 -28.6155 -0.0168 7.33 29 15,4514 113.3580 31 -28,6343 15.4744 -56.6940 -28.6343 15.4744 7.33 29 113,5239 -0.0168 -42,4526 22.9767 -84.1830 5 31 -0.0249 7.33 29 -42.4526 22.9767 168.5609 REACTIONS LOAD 🔧 JODE PΧ PY NO COMB MOMENT Units: K K -Ft κ COMBINATIONS: 1.40 X CASE MB 1 : 1.70 X CASE 2 3 1.40 X CASE 1.40 X CASE 2: 1.40 X CASE 1.70 X CASE 1.70 X CASE 3 1.70 X CASE MĒ 3: 1.00 X CASE 1.00 X CASE 2 1.00 X CASE 3 1.00 X CASE

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OGRAM : General Frame Analysis vl.58

PAGE NO. 20

TIME: Fri Mar 06 15:39:12 1992 LW. INC.

JOB NO. : 15

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		-14.1564	26.0672	-51.9536	
 /	4	-14,1554	26.0665	-51.9492	
	. 5	-20.9867	38.6254	-77,0078	
	•	r			
_ 2	į	22.9677	42.4505	-84,1373	
	2	22 . 9680	42.4511	-84.1376	
	3	15.5166	28.6739	-56,8427	
	4	15.5163	28.6733	-56.8423	
	ā	23.0188	42.4879	-84,3402	
_ 9	1	1,2389	84.9121	4.4088	
	2	1.2547	84.8756	4.4644	
•	3	0,9558	57.1256	3.4173	
	4	O.9378	57.1442	3.3540	
	grane Since	2.4838	82.4860	9.0277	
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		-1.8493	97.4567	6 . 960 4	
	3	-1.3850	65 . 5778	5.1933	
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1.6	1	-2.7109	87.3612	-9 . 9807	
	2	-3.2481	88.2503	-11.9536	
	3	-2.0504	59.1421	-7.5448	
	4	-1.4477	58.3940	-5,3314	
	5	-1.1089	82.0428	-4.0719	
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17	1	3.5136	100.2870	-12.8294	
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PAGE NO. 21

:OGRAM : General Frame Analysis v1.58 INC.

TIME: Fri Mar 06 15:39:13 1992

GSA COMPUTER ROOM 1019 - SLAB BEAM F

JOB NO. : 19

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•	2	-2.0683	102.8439	7.4363	
		-1.1086	69.0508	3.9670	
	4	-0.3206	68.1969	1.0884	
	5	1.8873	97.1025	-7 . 0389	
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30	1	20.8733	38.5234	76 . 5980	
	2	20.8549	38.5085	76.5400	
		14.0933	26.0141	51.7188	
	4	14.1119	26.0312	51.7847	
	J	20.9514	38,5933	74 . 8808	
31	1	-22,8864	42.3760	83.8479	
	2	-22.8662	42.3594	83.7716	
	3	-15.4514	28.4155	56.6076	
	4	-15.4744	28.6343	56.6940	
	5	-22.9767	42.4526	84.1830	
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BPLW rchitects & Engineers, Inc. 2400 Louisiana Blvd. NE 2405 Suine 400 Suine 602 Suine 602 Messa, AZ 85201 5) 881-2759 (602) 827-2759 Project No.

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Project			Note to the file
			☐ Minutes of meeting
Subject	***************************************	·	— □To be typed
Project No.	Date	By	0

CHECK. ANAL, BY MOMENT DIST. $K_{58} = 6.04$ (3) $C_{N_1}/l_1 = .1$ $K_{40} = 5.34$ (3.18) $C_{N_2}/l_2 = .1$ $K_{4} = 9(3.18)(129)$ $K_{4} = 2(9530)(2)$

1

 $K_{58} = 6.04 (3.12)(12800)/25(12) = 804$ $K_{48} = 5.34 (3.49)(67500)/11(12) = 9530$ $K_{4} = 9(3.12)(12925)/[300(1-.1)^{3}] = 1660$ $K_{ec} = 2(9530)(2)(1660)/2(9530) + 2(1660) = 2827$

☐ Memorandum

 $K_{ec} = 2(9530)(2)(1660)/2(9530)+2(1660) = 2827$ $W = .136(1.4) + .05(1.7) = .275^{Rof}(25) = 6.885^{Rof}$ $M_{eff} .0936$

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rchitects & Engineers, Inc.

2400 Louisiana Blvd. NE AFC #5 Suite 400 uquerque, NM 87110 5) 881-2759 63 East Main Stre Suite 602 Mesa, AZ 85201 (602) 827-2759 Project GSA-USFS-HVAC

Subject FLOOR ANAL.

Project No. 91062,005 Date 3/4/92 By

☐ Memorandum

☐ Telephone record

☐ Note to the file

☐ Minutes of meeting

☐ To be typed

SLAB BEAM "F" &G" - COL. LINE #3

TOP BARS = 26 #5 $A_5 = 12.4 N^2$ 14 #5 $A_5 = 12.4 N^2$

BOTTOM BARS = 22#5 As = 11.16 N2

NEG. MOMENT @ DROPPED PANEL:

$$M_{4} = 475^{1-k}$$

$$d = 10.31''$$

$$a = \frac{12.4(40)}{.85(3)(100)} = 1.945''$$

$$\phi M_n = \frac{1}{12} (.9) \left[12.4 (40) (10.31 - \frac{1.945}{2}) \right]$$

$$\phi M_n = 347^{1-k} < 475^{1-k} \times N.G.$$

NEG. MOMENT @ 8" SECTION

$$M_u = 123^{1-k}$$
 $d = 6.31''$
 $q = \frac{12.4(40)}{.95(3)(300)} = 0.648''$

$$\phi M_n = \frac{1}{12} (.9) \left[12.4(40)(6.31 - \frac{.648}{2}) \right]$$

$$\phi M_n = 223^{1-k} > 123^{1-k} \quad V OK$$

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chitects & Engineers, Inc.

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SLAB BEAM "F" - COL. LINE 3

$$A_5 = 11.16 \text{ IN}^2$$
 $M_4 = 169^{1-k}$
 $d = 6.31 \text{ IN}$

$$q = \frac{11.16(40)}{.95(3)(300)} = 0.584$$

$$\phi M_n = \frac{1}{12} (.9) \left[11.16 (40) (6.31 - \frac{.584}{2}) \right]$$

$$\phi M_n = 201.5^{1-k} > 169^{1-k} V OK$$

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SLAB BEAM "F" @ COL. LINE #4

NEG. MOMENT @ DROPPED PANEL

$$Mu = -478^{1-k} \qquad d = 10,31''$$

$$q = \frac{14.26(40)}{.85(3)(100)} = 2.24''$$

$$\phi M_n = \frac{1}{12} (.9) \left[14.26(40)(10.31 - \frac{2.24}{2}) \right]$$

$$\phi M_n = 393^{l-k} < 478^{l-k} \times N.G.$$

NEG. MOMENT & B" SECTION

$$Mu = -129.8^{-1-k}$$
 $d=6.31''$

$$q = \frac{14.26(40)}{.85(3)(300)} = 0.746$$

$$\phi M_n = \frac{1}{12} (.9) (14.26 (40) (6.31 - \frac{.746}{2})$$

$$= 254^{1-k} > 129.8^{1-k} VOK$$

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